Storm Water Management Plan
For Priority Projects
(Major SWMP)

Project Name:	Dia Dang Meditation Center
Permit Number (Land Development Projects):	PO4-016
Work Authorization Number (CIP):	
Applicant:	Dia Dang Meditation Center
Applicant's Address:	6326 Camino Del Rey, Bonsal CA. 92003
Plan Prepare By (*Leave blank if same as applicant*):	Spear & Associates, Inc 475 Production Stree San Marcos, CA 92078 Phn: (760) 736-2040
Date:	7/31/06
Revision Date ():	1/25/07

The County of San Diego Watershed Protection, Storm Water Management, and Discharge Control Ordinance (WPO) (Ordinance No. 9424) requires all applications for a permit or approval associated with a Land Disturbance Activity must be accompanied by a Storm Water Management Plan (SWMP) (section 67.804.f). The purpose of the SWMP is to describe how the project will minimize the short and long-term impacts on receiving water quality. Projects that meet the criteria for a priority project are required to prepare a Major SWMP.

Since the SWMP is a living document, revisions may be necessary during various stages of approval by the County. Please provide the approval information requested below.

Project Review Stage	Does the SWMP need revisions?		If YES, Provide Revision Date
	YES	NO	
	Yes		1/25/07

Instructions for a Major SWMP can be downloaded at http://www.co.sandiego.ca.us/dpw/stormwater/susmp.html.

Completion of the following checklist and attachments will fulfill the requirements of a Major SWMP for the project listed above.

PROJECT DESCRIPTION

This is project is located north of Camino Del Rey and 1.9± miles east of Highway 76. The site is 8.96± acres in area. The lowest elevation is located at the southwest corner and is 205 feet above sea elevation. The highest elevation is located at the northeast corner and is 410 feet above sea elevation. Therefore the site slopes from northeast to southwest. The average slope is 18%±. The property has three natural drainage courses that channel ther stormwater runoff from the property and also for off-site runoff (see Attachment "A" Location Map & Drainage Area Map).

Stormwater runoff from the drainage area flows to Camino Del Rey and then west along the northerly right-of-way for Camino Del Rey 1600± feet to a 6' x 12' box culvert that passes under Camino Del Rey and from there it flows into the Moosa Canyon Creek, thence westerly to the San Luis Rey River and then on to the Pacific Ocean.

The project consists of developing the northerly 3.3± acres for a Buddhist Meditation Center for fifty (50) monks. There will also be Sunday services from 9A.M. until 4P.M. Three new buildings are proposed, there are currently three existing buildings on the site, along with grass courts and parking areas (see Attachment "B" Project Map). Do to the increase of impervious area the post-development run-off for the 100 year storm event will increase from 34.14cfs to 42.08cfs, an increase of 7.94cfs. We have proposed two dry detention basins to insure that the post development flow is equal to or less than the pre-development flow.

PRIORITY PROJECT DETERMINATION

Please check the box that best describes the project. Does the project meet one of the following criteria?

PRIORITY PROJECT	YES	NO
Redevelopment within the County Urban Area that creates or adds at least 5,000 net square feet of additional impervious surface area	X	
Residential development of more than 10 units		
Commercial developments with a land area for development of greater than 100,000 square feet		X
Automotive repair shops		
Restaurants, where the land area for development is greater than 5.000 square feet		X
Hillside development, in an area with known erosive soil conditions, where there will be grading on any natural slope that is twenty-five percent or greater, if the development creates 5,000 square feet or more of impervious surface	X	
Environmentally Sensitive Areas: All development and redevelopment located within or directly adjacent to or discharging directly to an environmentally sensitive area (where discharges from the development or redevelopment will enter receiving waters within the environmentally sensitive area), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its naturally occurring condition.		X
Parking Lots 5,000 square feet or more or with 15 parking spaces or more and potentially exposed to urban runoff	X	
Streets, roads, highways, and freeways which would create a new paved surface that is 5,000 square feet or greater	X	

Limited Exclusion: Trenching and resurfacing work associated with utility projects are not considered priority projects. Parking lots, buildings and other structures associated with utility projects are subject to SUSMP requirements if one or more of the criteria above are met.

If you answered **NO** to all the questions, then **STOP**. Please complete a Minor SWMP for your project.

If you answered **YES** to any of the questions, please continue.

The following questions provide a guide to collecting information relevant to project stormwater quality issues. Please provide a description of the findings in text box below.

	QUESTIONS	COMPLETED	NA
1.	Describe the topography of the project area.	Hillside	
2.	Describe the local land use within the project area and adjacent areas.	Residential	
3.	Evaluate the presence of dry weather flow.	none	x
4.	Determine the receiving waters that may be affected by the project throughout the project life cycle (i.e., construction, maintenance and operation).	San Luis Rey River	
5.	For the project limits, list the 303(d) impaired receiving water bodies and their constituents of concern.	903.11 & 903.12 Coliform bacteria	
6.	Determine if there are any High Risk Areas (municipal or domestic water supply reservoirs or groundwater percolation facilities) within the project limits.		X
7.	Determine the Regional Board special requirements, including TMDLs, effluent limits, etc.		X
8.	Determine the general climate of the project area. Identify annual rainfall and rainfall intensity curves.	100 year Storm P6=3.2; P24=5.8	
9.	If considering Treatment BMPs, determine the soil classification, permeability, erodibility, and depth to groundwater.	B & C	
10.	Determine contaminated or hazardous soils within the project area.		X

Hydrologic Unit Contribution

The project site is located in the San Luis Rey River Hydrologic unit (903.0) and in the Bonsal sub-area Hydrologic unit (903.12). The project area is characterized by a rolling knoll mostly covered with native plants grasses, with some landscaped areas. There are no major significant natural drainage swales on site. Run-off from this site flows westerly along the north side of Camino Del Rey until it reaches an existing 6’ x 12’ box culvert that passes under Camino Del Rey, thence to Moosa Canyon Creek, thence westerly to the San Luis Rey River. The project area represents 0.14% of the Bonsal basin. The project is 500± feet from Moosa Creek and 2± miles to the confluence with the San Luis Rey River.

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Complete the checklist below to determine if Treatment Best Management Practices (BMPs) are required for the project.

No.	CRITERIA	YES	NO	INFORMATION
1.	Is this an emergency project		No	If YES, go to 6. If NO, continue to 2.
2.	Have TMDLs been established		No	If YES, go to 5.

No.	CRITERIA	YES	NO	INFORMATION
	for surface waters within the project limit?			If NO, continue to 3.
3.	Will the project directly discharge to a 303(d) impaired receiving water body?		No	If YES, go to 5. If NO, continue to 4.
4.	Is this project within the urban and environmentally sensitive areas as defined on the maps in Appendix B of the *County of San Diego Standard Urban Storm Water Mitigation Plan for Land Development and Public Improvement Projects*?		No	If YES, continue to 5. If NO, go to 6.
5.	Consider approved Treatment BMPs for the project.	Yes		If YES, go to 7.
6.	Project is not required to consider Treatment BMPs			Document for Project Files by referencing this checklist.
7.	End			

Now that the need for a treatment BMPs has been determined, other information is needed to complete the SWMP.

WATERSHED

Please check the watershed(s) for the project.

☐San Juan ☐Santa Margarita ☒San Luis Rey ☐Carlsbad
☐San Dieguito ☐Penasquitos ☐San Diego ☐Pueblo San Diego ☐Sweetwater ☐Otay ☐Tijuana

Please provide the hydrologic sub-area and number(s)

Number	Name
903.3	San Luis Rey HU
903.12	Bonsal Sub-Area

Please provide the beneficial uses for Inland Surface Waters and Ground Waters. Beneficial Uses can be obtained from the Water Quality Control Plan for the San Diego Basin, which is available at the Regional Board office or at http://www.swrcb.ca.gov/rwqcb9/programs/basinplan.html.

SURFACE WATERS	Hydrologic Unit Basin Number	MUN	AGR	IND	PROC	GWR	FRESH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Inland Surface Waters		X	X	X					X	X		X		X		
Ground Waters		X	X	X												

X Existing Beneficial Use
0 Potential Beneficial Use
* Excepted from Municipal

POLLUTANTS OF CONCERN

Using Table 1, identify pollutants that are anticipated to be generated from the proposed priority project categories. Pollutants associated with any hazardous material sites that have been remediated or are not threatened by the proposed project are not considered a pollutant of concern.

- Sediments---anticipated
- Nutrients---anticipated
- Heavy Metals---Potential
- Organic compounds—anticipated (including petroleum hydrocarbons)
- Trash & Debris---anticipated
- Oxygen Demanding Substances---Potential (including solvents)
- Oil & Grease---anticipated
- Bacteria & Viruses---anticipated
- Pesticides----------anticipated

Table 1. Anticipated and Potential Pollutants Generated by Land Use Type

	General Pollutant Categories								
Priority Project Categories	Sediments	Nutrients	Heavy Metals	Organic Compounds	Trash & Debris	Oxygen Demanding Substances	Oil & Grease	Bacteria & Viruses	Pesticides
Detached Residential Development	X	X			X	X	X	X	X
Attached Residential Development	X	X			X	P(1)	P(2)	P	X
Commercial Development >100,000 ft^2	P(1)	P(1)		P(2)	X	P(5)	X	P(3)	P(5)
Automotive Repair Shops			X	X(4)(5)	X		X		
Restaurants					X	X	X	X	
Hillside Development >5,000 ft^2	X	X			X	X	X		X

	General Pollutant Categories								
Priority Project Categories	Sediments	Nutrients	Heavy Metals	Organic Compounds	Trash & Debris	Oxygen Demanding Substances	Oil & Grease	Bacteria & Viruses	Pesticides
Parking Lots	P(1)	P(1)	X		X	P(1)	X		P(1)
Streets, Highways & Freeways	X	P(1)	X	X(4)	X	P(5)	X		

X = anticipated
P = potential
(1) A potential pollutant if landscaping exists on-site.
(2) A potential pollutant if the project includes uncovered parking areas.
(3) A potential pollutant if land use involves food or animal waste products.
(4) Including petroleum hydrocarbons.
(5) Including solvents.

Note: If other monitoring data that is relevant to the project is available. Please include as Attachment C.

CONSTRUCTION BMPs

Please check the construction BMPs that may be used. The BMPs selected are those that will be implemented during construction of the project. The applicant is responsible for the placement and maintenance of the BMPs selected.

☒ Silt Fence
☒ Fiber Rolls
☒ Street Sweeping and Vacuuming
☒ Storm Drain Inlet Protection
☒ Stockpile Management
☒ Solid Waste Management
☒ Stabilized Construction Entrance/Exit
☐ Dewatering Operations
☒ Vehicle and Equipment Maintenance
☐ Desilting Basin
☒ Gravel Bag Berm
☒ Sandbag Barrier
☒ Material Delivery and Storage
☒ Spill Prevention and Control
☒ Concrete Waste Management
☒ Water Conservation Practices
☒ Paving and Grinding Operations

☒ Any minor slopes created incidental to construction and not subject to a major or minor grading permit shall be protected by covering with plastic or tarp prior to a rain event, and shall have vegetative cover reestablished within 180 days of completion of the slope and prior to final building approval.

SITE DESIGN

To minimize stormwater impacts, site design measures must be addressed. The following checklist provides options for avoiding or reducing potential impacts during project planning.

If YES is checked, it is assumed that the measure was used for this project. If NO is checked, please provide a brief explanation why the option was not selected in the text box below.

	OPTIONS		YES	NO	N/A
1.	Can the project be relocated or realigned to avoid/reduce impacts to receiving waters or to increase the preservation of critical (or problematic) areas such as floodplains, steep slopes, wetlands, and areas with erosive or unstable soil conditions?				X
2.	Can the project be designed to minimize impervious footprint?		X		
3.	Conserve natural areas where feasible?		X		
4.	Where landscape is proposed, can rooftops, impervious sidewalks, walkways, trails and patios be drained into adjacent landscaping?		X		
5.	For roadway projects, can structures and bridges be designed or located to reduce work in live streams and minimize construction impacts?				X
6.	Can any of the following methods be utilized to minimize erosion from slopes:		X		
	6.a.	Disturbing existing slopes only when necessary?	X		
	6.b.	Minimize cut and fill areas to reduce slope lengths?	X		
	6.c.	Incorporating retaining walls to reduce steepness of slopes or to shorten slopes?	X		
	6.d.	Providing benches or terraces on high cut and fill slopes to reduce concentration of flows?	X		
	6.e.	Rounding and shaping slopes to reduce concentrated flow?	X		
	6.f.	Collecting concentrated flows in stabilized drains and channels?	X		

Please provide a brief explanation for each option that was checked N/A or NO in the following box.

If the project includes work in channels, then complete the following checklist. Information shall be obtained from the project drainage report.

No.	CRITERIA	YES	NO	N/A	COMMENTS
1.	Will the project increase velocity or volume of downstream flow?		X		If YES go to 5.
2.	Will the project discharge to unlined channels?	X			If YES go to 5.
3.	Will the project increase potential sediment load		X		If YES go to 5.

No.	CRITERIA	YES	NO	N/A	COMMENTS
	of downstream flow?				
4.	Will the project encroach, cross, realign, or cause other hydraulic changes to a stream that may affect upstream and/or downstream channel stability?		X		If YES go to 7.
5.	Review channel lining materials and design for stream bank erosion.			X	Continue to 6.
6.	Consider channel erosion control measures within the project limits as well as downstream. Consider scour velocity.	X			Continue to 7.
7.	Include, where appropriate, energy dissipation devices at culverts.	X			Continue to 8.
8.	Ensure all transitions between culvert outlets/headwalls/wingwalls and channels are smooth to reduce turbulence and scour.	X			Continue to 9.
9.	Include, if appropriate, detention facilities to reduce peak discharges.	X			
10.	“Hardening“ natural downstream areas to prevent erosion is not an acceptable technique for protecting channel slopes, unless pre-development conditions are determined to be so erosive that hardening would be required even in the absence of the proposed development.		X		Continue to 11.
11.	Provide other design principles that are comparable and equally effective.			X	Continue to 12.
12.	End				

SOURCE CONTROL

Please complete the following checklist for Source Control BMPs. If the BMP is not applicable for this project, then check N/A only at the main category.

BMP			YES	NO	N/A
1.	**Provide Storm Drain System Stenciling and Signage**				
	1.a.	All storm drain inlets and catch basins within the project area shall have a stencil or tile placed with prohibitive language (such as: "NO DUMPING – DRAINS TO _____") and/or graphical icons to discourage illegal dumping.	X		
	1.b.	Signs and prohibitive language and/or graphical icons, which prohibit illegal dumping, must be posted at public access points along channels and creeks within the project area.	X		
2.	**Design Outdoors Material Storage Areas to Reduce Pollution Introduction**				X
	2.a.	This is a detached single-family residential project. Therefore, personal storage areas are exempt from this requirement.		X	

BMP			YES	NO	N/A
	2.b.	Hazardous materials with the potential to contaminate urban runoff shall either be: (1) placed in an enclosure such as, but not limited to, a cabinet, shed, or similar structure that prevents contact with runoff or spillage to the storm water conveyance system; or (2) protected by secondary containment structures such as berms, dikes, or curbs.			X
	2.c.	The storage area shall be paved and sufficiently impervious to contain leaks and spills.			X
	2.d.	The storage area shall have a roof or awning to minimize direct precipitation within the secondary containment area.			X
3.	**Design Trash Storage Areas to Reduce Pollution Introduction**				
	3.a.	Paved with an impervious surface, designed not to allow run-on from adjoining areas, screened or walled to prevent off-site transport of trash; or,	X		
	3.b.	Provide attached lids on all trash containers that exclude rain, or roof or awning to minimize direct precipitation.	X		
4.	**Use Efficient Irrigation Systems & Landscape Design**		X		
	The following methods to reduce excessive irrigation runoff shall be considered, and incorporated and implemented where determined applicable and feasible.				
	4.a.	Employing rain shutoff devices to prevent irrigation after precipitation.	X		
	4.b.	Designing irrigation systems to each landscape area's specific water requirements.	X		
	4.c.	Using flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.	X		
	4.d.	Employing other comparable, equally effective, methods to reduce irrigation water runoff.	X		
5.	**Private Roads**				
	The design of private roadway drainage shall use at least one of the following		X		
	5.a.	Rural swale system: street sheet flows to vegetated swale or gravel shoulder, curbs at street corners, culverts under driveways and street crossings.	X		
	5.b.	Urban curb/swale system: street slopes to curb, periodic swale inlets drain to vegetated swale/biofilter.			X

	5.c.	Dual drainage system: First flush captured in street catch basins and discharged to adjacent vegetated swale or gravel shoulder, high flows connect directly to storm water conveyance system.			X
	5.d.	Other methods that are comparable and equally effective within the project.			X
6.	**Residential Driveways & Guest Parking**				
	The design of driveways and private residential parking areas shall use one at least of the following features.		X		
	6.a.	Design driveways with shared access, flared (single lane at street) or wheelstrips (paving only under tires); or, drain into landscaping prior to discharging to the storm water conveyance system.	X		
	6.b.	Uncovered temporary or guest parking on private residential lots may be: paved with a permeable surface; or, designed to drain into landscaping prior to discharging to the storm water conveyance system.	X		
	6.c.	Other features which are comparable and equally effective.			X
7.	**Dock Areas**				

		BMP	YES	NO	N/A
	Loading/unloading dock areas shall include the following.				X
	7.a.	Cover loading dock areas, or design drainage to preclude urban run-on and runoff.			
	7.b.	Direct connections to storm drains from depressed loading docks (truck wells) are prohibited.			
	7.c.	Other features which are comparable and equally effective.			
8.	**Maintenance Bays**				X
	Maintenance bays shall include the following.				
	8.a.	Repair/maintenance bays shall be indoors; or, designed to preclude urban run-on and runoff.			
	8.b.	Design a repair/maintenance bay drainage system to capture all wash water, leaks and spills. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm drain system is prohibited. If required by local jurisdiction, obtain an Industrial Waste Discharge Permit.			
	8.c.	Other features which are comparable and equally effective.			
9.	**Vehicle Wash Areas**				X
	Priority projects that include areas for washing/steam cleaning of vehicles shall use the following.				
	9.a.	Self-contained; or covered with a roof or overhang.			
	9.b.	Equipped with a clarifier or other pretreatment facility.			
	9.c.	Properly connected to a sanitary sewer.			
	9.d.	Other features which are comparable and equally effective.			
10.	**Outdoor Processing Areas**				X
	Outdoor process equipment operations, such as rock grinding or crushing, painting or coating, grinding or sanding, degreasing or parts cleaning, waste piles, and wastewater and solid waste treatment and disposal, and other operations determined to be a potential threat to water quality by the County shall adhere to the following requirements.				
	10.a.	Cover or enclose areas that would be the most significant source of pollutants; or, slope the area toward a dead-end sump; or, discharge to the sanitary sewer system following appropriate treatment in accordance with conditions established by the applicable sewer agency.			

	10.b.	Grade or berm area to prevent run-on from surrounding areas.			
	10.c.	Installation of storm drains in areas of equipment repair is prohibited.			
	10.d.	Other features which are comparable or equally effective.			
11.	**Equipment Wash Areas**				X
	Outdoor equipment/accessory washing and steam cleaning activities shall be.				
	11.a.	Be self-contained; or covered with a roof or overhang.			
	11.b.	Be equipped with a clarifier, grease trap or other pretreatment facility, as appropriate			
	11.c.	Be properly connected to a sanitary sewer.			
	11.d.	Other features which are comparable or equally effective.			
12.	**Parking Areas**		X		
	The following design concepts shall be considered, and incorporated and implemented where determined applicable and feasible by the County.		X		
	12.a.	Where landscaping is proposed in parking areas, incorporate landscape areas into the drainage design.	X		

BMP			**YES**	**NO**	**N/A**
	12.b.	Overflow parking (parking stalls provided in excess of the County's minimum parking requirements) may be constructed with permeable paving.			X
	12.c.	Other design concepts that are comparable and equally effective.			X
13.	**Fueling Area**				X
	Non-retail fuel dispensing areas shall contain the following.				
	13.a.	Overhanging roof structure or canopy. The cover's minimum dimensions must be equal to or greater than the area within the grade break. The cover must not drain onto the fuel dispensing area and the downspouts must be routed to prevent drainage across the fueling area. The fueling area shall drain to the project's treatment control BMP(s) prior to discharging to the storm water conveyance system.			
	13.b.	Paved with Portland cement concrete (or equivalent smooth impervious surface). The use of asphalt concrete shall be prohibited.			
	13.c.	Have an appropriate slope to prevent ponding, and must be separated from the rest of the site by a grade break that prevents run-on of urban runoff.			
	13.d.	At a minimum, the concrete fuel dispensing area must extend 6.5 feet (2.0 meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less.			

Please list other project specific Source Control BMPs in the following box. Write **N/A** if there are none and briefly explain. N/A – The Source Control BMPs mentioned above will provide Source pollution control to the maximum extent practicable.

TREATMENT CONTROL

To select a structural treatment BMP using Treatment Control BMP Selection Matrix (Table 2), each priority project shall compare the list of pollutants for which the downstream receiving waters are impaired (if any), with the pollutants anticipated to be generated by the project (as identified in Table 1). Any pollutants identified by Table 1, which are also causing a Clean Water Act section 303(d) impairment of the receiving waters of the project, shall be considered primary pollutants of concern. Priority projects that are anticipated to generate a primary pollutant of concern shall select a single or combination of stormwater BMPs from Table 2, which **maximizes pollutant removal** for the particular primary pollutant(s) of concern.

Priority projects that are **not** anticipated to generate a pollutant for which the receiving water is Clean Water Act Section 303(d) impaired shall select a single or combination of stormwater BMPs from Table 2, which are effective for pollutant removal of the identified secondary pollutants of concern, consistent with the "maximum extent practicable" standard.

Table 2. Treatment Control BMP Selection Matrix

Pollutant of Concern	***Treatment Control BMP Categories (Yes Indicates PROVIDED)***						
	Biofilters Yes	Detention Basins Extended Yes/CASQA	Infiltration Basins(2)	Wet Ponds or Wetlands	Drainage Inserts Yes	Filtration	Hydrodynamic Separator Systems(3)
Sediment	M	M	H	H	L	H	M
Nutrients	L	L	M	M	L	M	L
Heavy Metals	M	M	M	H	L	H	L
Organic Compounds	U	M	U	M	L	M	L
Trash & Debris	L	H	U	H	M	H	M
Oxygen Demanding Substances	L	M	M	M	L	M	L
Bacteria	U	M	H	H	L	M	L
Oil & Grease	M	M	U	U	L	H	L
Pesticides	U	U	U	L	L	U	L

(1) Copermittees are encouraged to periodically assess the performance characteristics of many of these BMPs to update this table.
(2) Including trenches and porous pavement.
(3) Also known as hydrodynamic devices and baffle boxes.

L: Low removal efficiency:
M: Medium removal efficiency:
H: High removal efficiency:
U: Unknown removal efficiency

Sources: *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* (1993), *National Stormwater Best Management Practices Database* (2001), *Guide for BMP Selection in Urban Developed Areas* (2001), *and Caltrans New Technology Report (2001).*

A Treatment BMP must address runoff from developed areas. Please provide the post-construction water quality values for the project. Label outfalls on the BMP map. Q_{WQ} is dependent on the type of treatment BMP selected for the project.

Table 2.1 Post-Construction Water Quality Flows

Outfall	**Tributary Area (acres)**	Q100 (cfs)	Qw/ Detention	Qwq I=0.2in/hr		Vwq (cfs) For 85th %	
Point "P" Post-Development	2.77	8.65	1.69	0.3			
Point "P" Pre-Development	1.99	2.94	<2.94				
Increase in acres & flow	0.78	4.05	-1.25				
Point "M" Post-Development	19.94	24.22		N/A			
Point "M" Pre-Development	19.74	23.77					
Increase in acres & flow	0.20	0.45					
Point "N" Post-Development	3.46	11.28	5.02	0.34		2805	
Point "N" Pre-Development	3.5	9.43	<9.43				
Increase in acres & flow	-0.04	1.85	-4.39				

Note: The total Post-Dev. Q (M+N)=35.50cfs; Total Post-Dev Q (M+N) w/detention=30.15cfs: The Total Pre-Dev QM+N=33.2cfs; Therefore Post-Dev. Q (M+N) is 3.05cfs less.

Please check the box(s) that best describes the Treatment BMP(s) selected for this project.

Biofilters

☒ Grass swale
☒ Grass strip
☐ Wetland vegetation swale
☐ Bioretention

Detention Basins

☒ Extended/dry detention basin with grass lining
☐ Extended/dry detention basin with impervious lining

Infiltration Basins
☐ Infiltration basin
☐ Infiltration trench
☐ Porous asphalt
☒ Porous concrete
☒ Porous modular concrete block

Wet Ponds or Wetlands
☐ Wet pond/basin (permanent pool)
☐ Constructed wetland

Drainage Inserts (See note below)
☐ Oil/Water separator
☒ Catch basin insert
☐ Storm drain inserts
☐ Catch basin screens

Filtration
☐ Media filtration
☐ Sand filtration

Hydrodynamic Separator Systems
☐ Swirl Concentrator
☐ Cyclone Separator
☐ Baffle Separator
☐ Gross Solids Removal Device
☐ Linear Radial Device

Note: Catch basin inserts and storm drain inserts are excluded from use on County maintained right-of-way and easements.

Include Treatment Datasheet as Attachment E. The datasheet should include the following:	**COMPLETED**	**NO**
1. Description of how treatment BMP was designed. Provide a Description for each type of treatment BMP.	Grass lawns Biofilters and natural onsite swales and vegetation Detention basin Drain inserts	
2. Engineering calculations for the BMP(s)	Yes	

Please describe why the selected treatment BMP(s) was selected for this project. For projects utilizing a low performing BMP, please provide a detailed explanation and justification.

Treatment Control BMPs

The County of San Diego Ordinances for 9424 and 9426 requires that priority projects incorporate into the design a single or combination of treatment control BMPs designed to infiltrate, filter, and or treat run-off from the projects footprint to one of the Numeric Sizing Treatments Standards". We have selected a series of BMP's as treatment for the Pollutants anticipated for this type of project.

This project will use two types of Post development treatment control BMPs:

- Grass lawns and Swales (TC 30 & 31)
- Storm drain inserts (MP-52)
- Extended dry detention basin (TC-22)

We have selected the above treatment BMPs because they will best remove the Pollutants of Concern anticipated by the project as there are no listed 303d waterways down stream from this project listed. We have therefore provided two low to medium BMP's. These BMP's will provide removal of the POC's to the **maximum extent practicable.**

We have evaluated the following BMPs which will treat bacteria per CASQA:

1) Detention Basins
2) Infiltration basins
3) Wetlands
4) Filtration

All of these BMPs require large area and or a Soil Group with a high infiltration rate.

The following are our findings:

1) Detention Basins- We provided a detention basin with a treatment volume that would meet CASQA standards.
2) Infiltration basins-the project's terrain is to steep and would require to much area
3) Wetlands-same as (2) and a wetland would have to be designed and constructed. Wetlands would also cause a Vector problem.
4) Filtration-The Soil Group "B" & "C" and would provide fair filtration. But again the site is to steep and small to provide filtration ponds.

We therefore have designed the site to use a train Site, Source and Treatment Control of BMPs. All roof areas and impervious areas on each lot will drain to grass areas and then to one of the two Treatment Control- grass Swales and Storm Drain Inserts; dry detention basin. All BMPs must be in place prior to the completion and acceptance of the Project by the County of San Diego. The Treatment Control BMPs (a medium effective BMP) will treat the anticipated pollutants to the maximum extent practicable.

MAINTENANCE
Please check the box that best describes the maintenance mechanism(s) for this project.

CATEGORY	SELECTED	
	YES	NO
First		
Second	X	
Third		
Fourth		

The Owner/Applicant will be responsible for maintaining all Project BMPs. The Owner/Applicant will enter into an agreement with the County of San Diego stating that if the Owner Applicant fails to provide the required maintenance the County of San Diego will have the right of entry to said property for the specific purpose of maintaining said BMPs and the County of San Diego shall bill the Owner/Applicant for all cost for including but not limit to: labor, materials, equipment, supervision, and accounting.

ATTACHMENTS
Please include the following attachments.

ATTACHMENT		COMPLETED	N/A
A	Project Location Map	X	
B	Site Map	X	
C	Relevant Monitoring Data		X
D	Treatment BMP Location Map	X	
E	Treatment BMP Datasheets	X	
F	Operation and Maintenance Program for Treatment BMPs	X	
G	Engineer’s Certification Sheet	X	

ATTACHMENT A

LOCATION MAP

SITE
Camino Del Rey
© 2007 Europa Technologies
© 2007 Navteq
Google

Scale: 1"=200'

N

CityGIS5

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Scale: 1"=600'

N

CityGIS5

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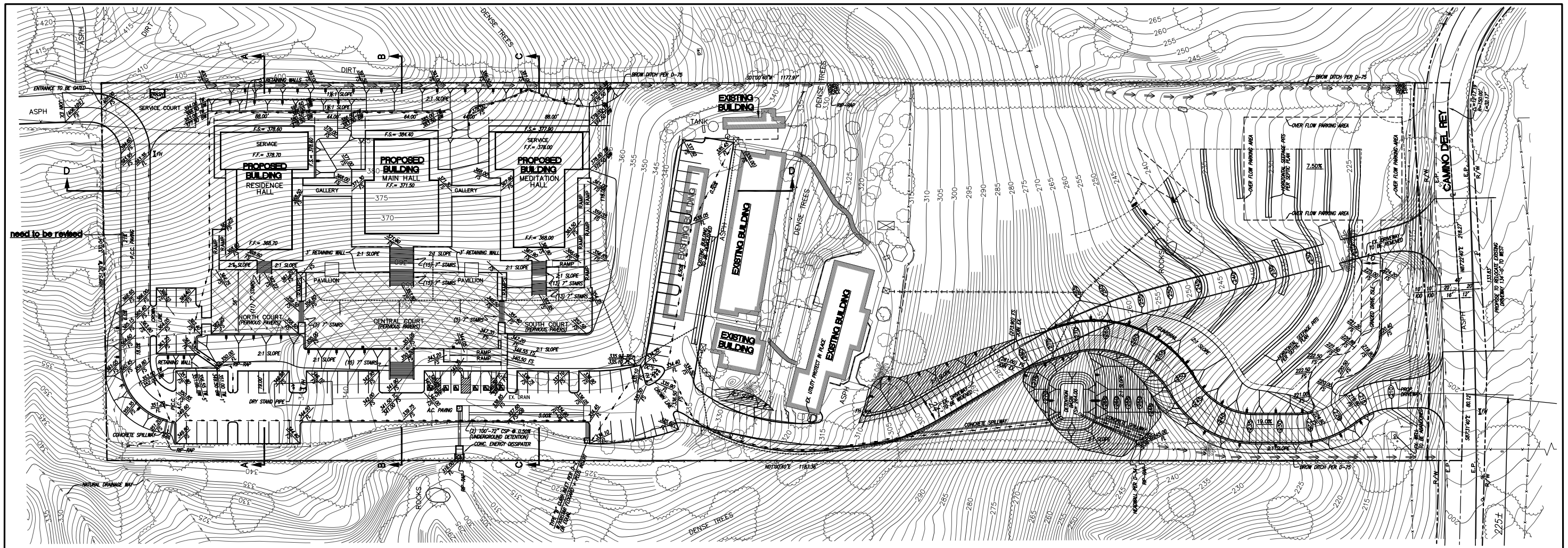
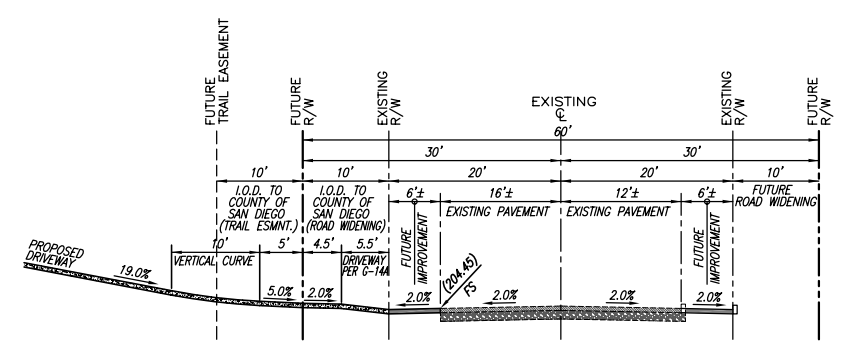
ATTACHMENT B

PROJECT SITE MAP



SEE SHEET TWO FOR CROSS SECTIONS

SCALE: 1" = 40'



SECTION D-D
CAMINO DEL REY TYPICAL SECTION
PROPOSED DRIVEWAY CONNECTION

APPLICANT/OWNER

DAI DANG MEDITATION CENTER
6326 CAMINO DEL REY
BONSALL, CA 92003
(760) 945-5588

TOPOGRAPHY SOURCE

TOWILL, INC., 5933 SEA LION PLACE, SUITE 100
CARLSBAD, CA 92010-6624.
TOPO SOURCE METHOD: AERIAL PHOTO
TOPO SOURCE DATE: 06-04-03

"CONCEPTUAL GRADING PLAN"

A.P.N. 127-460-14

NOTE:
THIS PLAN IS PROVIDED TO ALLOW FOR FULL AND ADEQUATE DISCRETIONARY REVIEW OF A PROPOSED DEVELOPMENT PROJECT. THE PROPERTY OWNER ACKNOWLEDGES THAT ACCEPTANCE OR APPROVAL OF THIS PLAN DOES NOT CONSTITUTE AN APPROVAL TO PERFORM ANY GRADING SHOWN HEREON, AND AGREES TO OBTAIN VALID GRADING PERMISSIONS BEFORE COMMENCING SUCH ACTIVITY.

LARGEST CUT SLOPE ONSITE HAS A RATIO OF 1½:1 WITH AN ELEVATION DIFFERENCE OF 13'.
LARGEST FILL SLOPE ONSITE HAS A RATIO OF 2:1 WITH AN ELEVATION DIFFERENCE OF 28'.

PROPOSED PARKING
81 PARKING SPACES (OVERALL)
6 (HANDICAP) SPACES
67 (FULL) SPACES
8 (COMPACT) SPACES

EARTHWORK QUANTITIES
FOR PROPOSED BUILDINGS AND PARKING LOTS

CUT: 11,000± C.Y.
FILL: 8,500± C.Y.
BALANCE: *1,500± EXPORT TO DRIVEWAY C.Y.
BALANCE: 1,000± EXPORT OFFSITE C.Y.

EARTHWORK QUANTITIES
FOR THE REMOVAL OF THE EX. DRIVEWAY & CONST. OF PROP DRIVEWAY AND DETENTION BASIN

CUT: 3,400± C.Y.
FILL: 4,900± C.Y.
BALANCE: *1,500± IMPORT C.Y.

COUNTY APPROVED CHANGES			
NO.		Approved by	Date

PERMITS
REZONE PERMIT NO. N/A
SPECIAL USE PERMIT NO. N/A
TENTATIVE MAP NO. N/A

BENCH MARK
DESCRIPTION: FOUND ROUND DISC. PNTD USBM STD DSK R 301
1.95 MI. E BONSLL AT CURV @ S SLOPE HILL 38 FT N C/L RD 5 FT E
5x7 FTBLDR TOP 2.25x3 FT GRANIT OUTCROP.
RECORD FROM: B.M. R301
ELEVATION: 224.33 DATUM: .

PRIVATE CONTRACT

SHEET 1	COUNTY OF SAN DIEGO DEPARTMENT OF PUBLIC WORKS	2 SHEETS

CONCEPTUAL GRADING PLAN FOR:
DAI DANG MEDITATION CENTER
CALIFORNIA COORDINATE INDEX .

Approved DOUGLAS M. ISBELL
COUNTY ENGINEER
BY: DATE

ENGINEER OF WORK:
RICHARD W. HARTLEY R.C.E. 20934 EXP. 9/30/05
GRADING PERMIT NO. *

ENGINEER'S NAME: SPEAR & ASSOCIATES, INC
PHONE NO. 1-760-736-2040

SPEAR & ASSOCIATES PROJECT NO. 03-190 DIF/JRZ

C-738

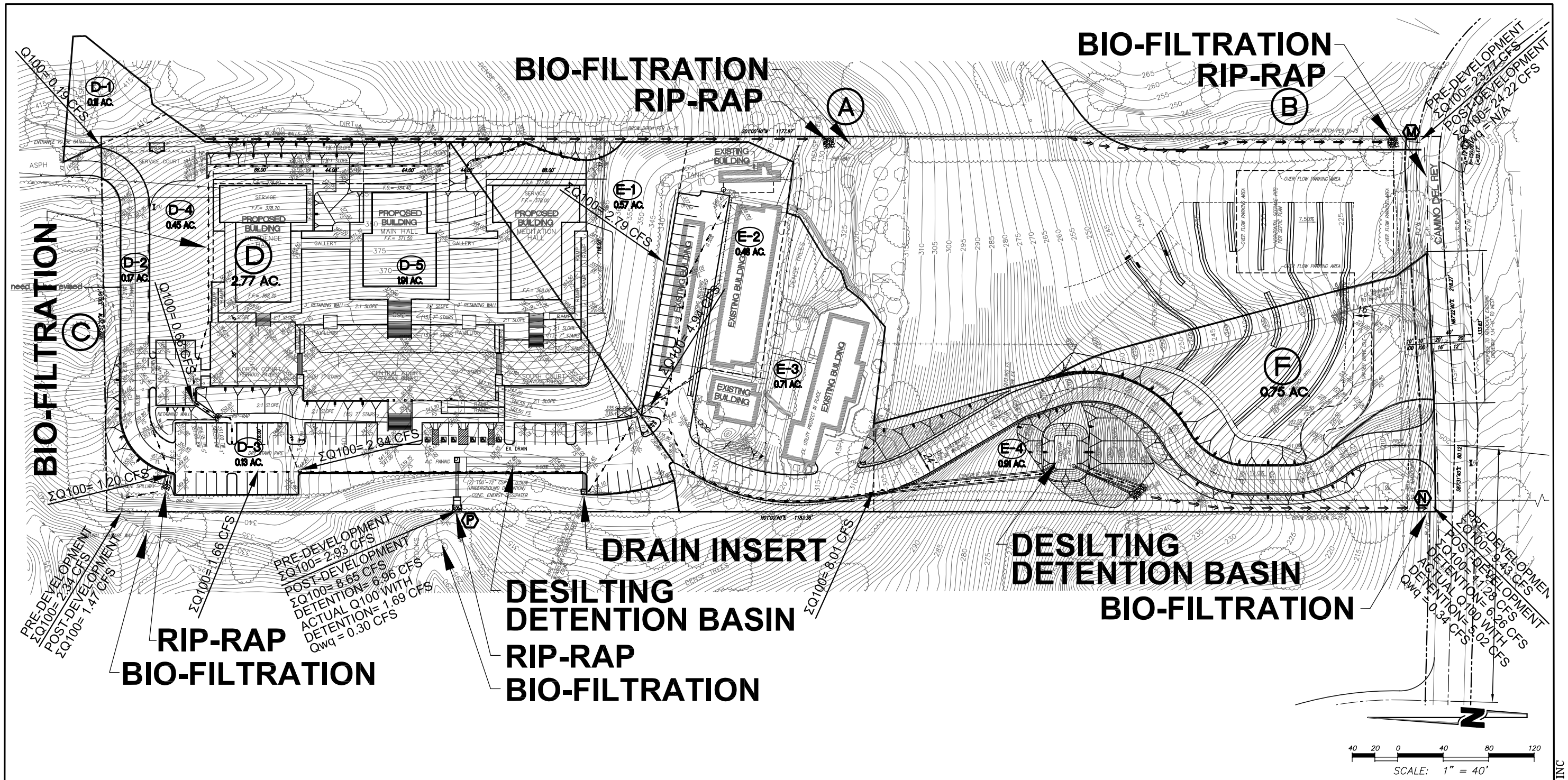
ATTACHMENT C

RELEVANT MONITORING DATA

*(**NOTE:** PROVIDE RELEVANT WATER QUALITY MONITORING DATA IF AVAILABLE.)*

ATTACHMENT D

TREATMENT BMP LOCATION MAP



TOPOGRAPHY SOURCE

TOWILL, INC., 5933 SEA LION PLACE, SUITE 100
CARLSBAD, CA 92010-6624.
TOPO SOURCE METHOD: AERIAL PHOTO
TOPO SOURCE DATE: 06-04-03

PROPOSED PARKING
81 PARKING SPACES (OVERALL)
6 (HANDICAP) SPACES
67 (FULL) SPACES
8 (COMPACT) SPACES

NOTE:
THIS PLAN IS PROVIDED TO ALLOW FOR FULL AND ADEQUATE DISCRETIONARY REVIEW OF A PROPOSED DEVELOPMENT PROJECT. THE PROPERTY OWNER ACKNOWLEDGES THAT ACCEPTANCE OR APPROVAL OF THIS PLAN DOES NOT CONSTITUTE AN APPROVAL TO PERFORM ANY GRADING SHOWN HEREON, AND AGREES TO OBTAIN VALID GRADING PERMISSIONS BEFORE COMMENCING SUCH ACTIVITY.

EARTHWORK QUANTITIES

CUT: 11,000± C.Y.
FILL: 8,500± C.Y.
BALANCE: 2,500± EXPORT C.Y.

COUNTY APPROVED CHANGES

NO.		Approved by	Date

PERMITS

REZONE PERMIT NO. N/A
SPECIAL USE PERMIT NO. N/A
TENTATIVE MAP NO. N/A

BENCH MARK

DESCRIPTION: FOUND ROUND DISC. PNTD USBM STD DSK R 301
1.95 MI. E BONSLL AT CURV @ S SLOPE HILL 38 FT N C/L RD 5 FT E
5x7 FTBLDR TOP 2.25x3 FT GRANIT OUTCROP.
RECORD FROM: B.M. R301
ELEVATION: 224.33 DATUM: -

APPLICANT/OWNER

DAI DANG MEDITATION CENTER
6326 CAMINO DEL REY
BONSALL, CA 92003
(760) 945-5588

A.P.N. 127-460-14

PRIVATE CONTRACT

SHEET 1 | COUNTY OF SAN DIEGO DEPARTMENT OF PUBLIC WORKS | 2 SHEETS

TREATMENT BMP LOCATION MAP FOR:

DAI DANG MEDITATION CENTER

CALIFORNIA COORDINATE INDEX .

Approved DOUGLAS M. ISBELL
COUNTY ENGINEER
BY: DATE

ENGINEER OF WORK:
RICHARD M. HARTLEY R.C.E. 20934 EXP. 9/30/05

GRADING PERMIT NO. *

ENGINEER'S NAME: SPEAR & ASSOCIATES, INC
PHONE NO. 1-760-736-2040

SPEAR & ASSOCIATES PROJECT NO. 03-190 DIF/JRZ

TREATMENT BMP LOCATION MAP

ATTACHMENT E

TREATMENT BMP DATASHEET

*(**NOTE:** POSSIBLE SOURCE FOR DATASHEETS CAN BE FOUND AT WWW.CABMPHANDBOOKS.COM. INCLUDE ENGINEERING CALCULATIONS FOR SIZING THE TREATMENT BMP.)*

Extended Detention Basin TC-22

Design Considerations

- Tributary Area
- Area Required
- Hydraulic Head

Description

Dry extended detention ponds (a.k.a. dry ponds, extended detention basins, detention ponds, extended detention ponds) are basins whose outlets have been designed to detain the stormwater runoff from a water quality design storm for some minimum time (e.g., 48 hours) to allow particles and associated pollutants to settle. Unlike wet ponds, these facilities do not have a large permanent pool. They can also be used to provide flood control by including additional flood detention storage.

California Experience

Caltrans constructed and monitored 5 extended detention basins in southern California with design drain times of 72 hours. Four of the basins were earthen, less costly and had substantially better load reduction because of infiltration that occurred, than the concrete basin. The Caltrans study reaffirmed the flexibility and performance of this conventional technology. The small headloss and few siting constraints suggest that these devices are one of the most applicable technologies for stormwater treatment.

Advantages

- Due to the simplicity of design, extended detention basins are relatively easy and inexpensive to construct and operate.
- Extended detention basins can provide substantial capture of sediment and the toxics fraction associated with particulates.
- Widespread application with sufficient capture volume can provide significant control of channel erosion and enlargement caused by changes to flow frequency

Targeted Constituents

☑	Sediment	▲
☑	Nutrients	●
☑	Trash	■
☑	Metals	▲
☑	Bacteria	▲
☑	Oil and Grease	▲
☑	Organics	▲

Legend *(Removal Effectiveness)*

● Low ■ High

▲ Medium

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CALIFORNIA STORMWATER QUALITY ASSOCIATION

relationships resulting from the increase of impervious cover in a watershed.

Limitations

- Limitation of the diameter of the orifice may not allow use of extended detention in watersheds of less than 5 acres (would require an orifice with a diameter of less than 0.5 inches that would be prone to clogging).
- Dry extended detention ponds have only moderate pollutant removal when compared to some other structural stormwater practices, and they are relatively ineffective at removing soluble pollutants.
- Although wet ponds can increase property values, dry ponds can actually detract from the value of a home due to the adverse aesthetics of dry, bare areas and inlet and outlet structures.

Design and Sizing Guidelines

- Capture volume determined by local requirements or sized to treat 85% of the annual runoff volume.
- Outlet designed to discharge the capture volume over a period of hours.
- Length to width ratio of at least 1.5:1 where feasible.
- Basin depths optimally range from 2 to 5 feet.
- Include energy dissipation in the inlet design to reduce resuspension of accumulated sediment.
- A maintenance ramp and perimeter access should be included in the design to facilitate access to the basin for maintenance activities and for vector surveillance and control.
- Use a draw down time of 48 hours in most areas of California. Draw down times in excess of 48 hours may result in vector breeding, and should be used only after coordination with local vector control authorities. Draw down times of less than 48 hours should be limited to BMP drainage areas with coarse soils that readily settle and to watersheds where warming may be determined to downstream fisheries.

Construction / Inspection Considerations

- Inspect facility after first large to storm to determine whether the desired residence time has been achieved.
- When constructed with small tributary area, orifice sizing is critical and inspection should verify that flow through additional openings such as bolt holes does not occur.

Performance

One objective of stormwater management practices can be to reduce the flood hazard associated with large storm events by reducing the peak flow associated with these storms. Dry extended detention basins can easily be designed for flood control, and this is actually the primary purpose of most detention ponds.

Dry extended detention basins provide moderate pollutant removal, provided that the recommended design features are incorporated. Although they can be effective at removing some pollutants through settling, they are less effective at removing soluble pollutants because of the absence of a permanent pool. Several studies are available on the effectiveness of dry extended detention ponds including one recently concluded by Caltrans (2002).

The load reduction is greater than the concentration reduction because of the substantial infiltration that occurs. Although the infiltration of stormwater is clearly beneficial to surface receiving waters, there is the potential for groundwater contamination. Previous research on the effects of incidental infiltration on groundwater quality indicated that the risk of contamination is minimal.

There were substantial differences in the amount of infiltration that were observed in the earthen basins during the Caltrans study. On average, approximately 40 percent of the runoff entering the unlined basins infiltrated and was not discharged. The percentage ranged from a high of about 60 percent to a low of only about 8 percent for the different facilities. Climatic conditions and local water table elevation are likely the principal causes of this difference. The least infiltration occurred at a site located on the coast where humidity is higher and the basin invert is within a few meters of sea level. Conversely, the most infiltration occurred at a facility located well inland in Los Angeles County where the climate is much warmer and the humidity is less, resulting in lower soil moisture content in the basin floor at the beginning of storms.

Vegetated detention basins appear to have greater pollutant removal than concrete basins. In the Caltrans study, the concrete basin exported sediment and associated pollutants during a number of storms. Export was not as common in the earthen basins, where the vegetation appeared to help stabilize the retained sediment.

Siting Criteria

Dry extended detention ponds are among the most widely applicable stormwater management practices and are especially useful in retrofit situations where their low hydraulic head requirements allow them to be sited within the constraints of the existing storm drain system. In addition, many communities have detention basins designed for flood control. It is possible to modify these facilities to incorporate features that provide water quality treatment and/or channel protection. Although dry extended detention ponds can be applied rather broadly, designers need to ensure that they are feasible at the site in question. This section provides basic guidelines for siting dry extended detention ponds.

In general, dry extended detention ponds should be used on sites with a minimum area of 5 acres. With this size catchment area, the orifice size can be on the order of 0.5 inches. On smaller sites, it can be challenging to provide channel or water quality control because the orifice diameter at the outlet needed to control relatively small storms becomes very small and thus prone to clogging. In addition, it is generally more cost-effective to control larger drainage areas due to the economies of scale.

Extended detention basins can be used with almost all soils and geology, with minor design adjustments for regions of rapidly percolating soils such as sand. In these areas, extended detention ponds may need an impermeable liner to prevent ground water contamination.

The base of the extended detention facility should not intersect the water table. A permanently wet bottom may become a mosquito breeding ground. Research in Southwest Florida (Santana et al., 1994) demonstrated that intermittently flooded systems, such as dry extended detention ponds, produce more mosquitoes than other pond systems, particularly when the facilities remained wet for more than 3 days following heavy rainfall.

A study in Prince George's County, Maryland, found that stormwater management practices can increase stream temperatures (Galli, 1990). Overall, dry extended detention ponds increased temperature by about 5°F. In cold water streams, dry ponds should be designed to detain stormwater for a relatively short time (i.e., 24 hours) to minimize the amount of warming that occurs in the basin.

Additional Design Guidelines

In order to enhance the effectiveness of extended detention basins, the dimensions of the basin must be sized appropriately. Merely providing the required storage volume will not ensure maximum constituent removal. By effectively configuring the basin, the designer will create a long flow path, promote the establishment of low velocities, and avoid having stagnant areas of the basin. To promote settling and to attain an appealing environment, the design of the basin should consider the length to width ratio, cross-sectional areas, basin slopes and pond configuration, and aesthetics (Young et al., 1996).

Energy dissipation structures should be included for the basin inlet to prevent resuspension of accumulated sediment. The use of stilling basins for this purpose should be avoided because the standing water provides a breeding area for mosquitoes.

Extended detention facilities should be sized to completely capture the water quality volume. A micropool is often recommended for inclusion in the design and one is shown in the schematic diagram. These small permanent pools greatly increase the potential for mosquito breeding and complicate maintenance activities; consequently, they are not recommended for use in California.

A large aspect ratio may improve the performance of detention basins; consequently, the outlets should be placed to maximize the flowpath through the facility. The ratio of flowpath length to width from the inlet to the outlet should be at least 1.5:1 (L:W) where feasible. Basin depths optimally range from 2 to 5 feet.

The facility's drawdown time should be regulated by an orifice or weir. In general, the outflow structure should have a trash rack or other acceptable means of preventing clogging at the entrance to the outflow pipes. The outlet design implemented by Caltrans in the facilities constructed in San Diego County used an outlet riser with orifices

Figure 1
Example of Extended Detention Outlet Structure

sized to discharge the water quality volume, and the riser overflow height was set to the design storm elevation. A stainless steel screen was placed around the outlet riser to ensure that the orifices would not become clogged with debris. Sites either used a separate riser or broad crested weir for overflow of runoff for the 25 and greater year storms. A picture of a typical outlet is presented in Figure 1.

The outflow structure should be sized to allow for complete drawdown of the water quality volume in 72 hours. No more than 50% of the water quality volume should drain from the facility within the first 24 hours. The outflow structure can be fitted with a valve so that discharge from the basin can be halted in case of an accidental spill in the watershed.

Summary of Design Recommendations

(1) Facility Sizing - The required water quality volume is determined by local regulations or the basin should be sized to capture and treat 85% of the annual runoff volume. See Section 5.5.1 of the handbook for a discussion of volume-based design.

Basin Configuration – A high aspect ratio may improve the performance of detention basins; consequently, the outlets should be placed to maximize the flowpath through the facility. The ratio of flowpath length to width from the inlet to the outlet should be at least 1.5:1 (L:W). The flowpath length is defined as the distance from the inlet to the outlet as measured at the surface. The width is defined as the mean width of the basin. Basin depths optimally range from 2 to 5 feet. The basin may include a sediment forebay to provide the opportunity for larger particles to settle out.

A micropool should not be incorporated in the design because of vector concerns. For online facilities, the principal and emergency spillways must be sized to provide 1.0 foot of freeboard during the 25-year event and to safely pass the flow from 100-year storm.

(2) Pond Side Slopes - Side slopes of the pond should be 3:1 (H:V) or flatter for grass stabilized slopes. Slopes steeper than 3:1 (H:V) must be stabilized with an appropriate slope stabilization practice.

(3) Basin Lining – Basins must be constructed to prevent possible contamination of groundwater below the facility.

(4) Basin Inlet – Energy dissipation is required at the basin inlet to reduce resuspension of accumulated sediment and to reduce the tendency for short-circuiting.

(5) Outflow Structure - The facility's drawdown time should be regulated by a gate valve or orifice plate. In general, the outflow structure should have a trash rack or other acceptable means of preventing clogging at the entrance to the outflow pipes.

The outflow structure should be sized to allow for complete drawdown of the water quality volume in 72 hours. No more than 50% of the water quality volume should drain from the facility within the first 24 hours. The outflow structure should be fitted with a valve so that discharge from the basin can be halted in case of an accidental spill in the watershed. This same valve also can be used to regulate the rate of discharge from the basin.

The discharge through a control orifice is calculated from:

$$Q = CA(2g(H-H_0))^{0.5}$$

where: Q = discharge (ft^3/s)
C = orifice coefficient
A = area of the orifice (ft^2)
g = gravitational constant (32.2)
H = water surface elevation (ft)
H_0= orifice elevation (ft)

Recommended values for C are 0.66 for thin materials and 0.80 when the material is thicker than the orifice diameter. This equation can be implemented in spreadsheet form with the pond stage/volume relationship to calculate drain time. To do this, use the initial height of the water above the orifice for the water quality volume. Calculate the discharge and assume that it remains constant for approximately 10 minutes. Based on that discharge, estimate the total discharge during that interval and the new elevation based on the stage volume relationship. Continue to iterate until H is approximately equal to H_0. When using multiple orifices the discharge from each is summed.

(6) Splitter Box - When the pond is designed as an offline facility, a splitter structure is used to isolate the water quality volume. The splitter box, or other flow diverting approach, should be designed to convey the 25-year storm event while providing at least 1.0 foot of freeboard along pond side slopes.

(7) Erosion Protection at the Outfall - For online facilities, special consideration should be given to the facility's outfall location. Flared pipe end sections that discharge at or near the stream invert are preferred. The channel immediately below the pond outfall should be modified to conform to natural dimensions, and lined with large stone riprap placed over filter cloth. Energy dissipation may be required to reduce flow velocities from the primary spillway to non-erosive velocities.

(8) Safety Considerations - Safety is provided either by fencing of the facility or by managing the contours of the pond to eliminate dropoffs and other hazards. Earthen side slopes should not exceed 3:1 (H:V) and should terminate on a flat safety bench area. Landscaping can be used to impede access to the facility. The primary spillway opening must not permit access by small children. Outfall pipes above 48 inches in diameter should be fenced.

Maintenance

Routine maintenance activity is often thought to consist mostly of sediment and trash and debris removal; however, these activities often constitute only a small fraction of the maintenance hours. During a recent study by Caltrans, 72 hours of maintenance was performed annually, but only a little over 7 hours was spent on sediment and trash removal. The largest recurring activity was vegetation management, routine mowing. The largest absolute number of hours was associated with vector control because of mosquito breeding that occurred in the stilling basins (example of standing water to be avoided) installed as energy dissipaters. In most cases, basic housekeeping practices such as removal of debris accumulations and vegetation

management to ensure that the basin dewaters completely in 48-72 hours is sufficient to prevent creating mosquito and other vector habitats.

Consequently, maintenance costs should be estimated based primarily on the mowing frequency and the time required. Mowing should be done at least annually to avoid establishment of woody vegetation, but may need to be performed much more frequently if aesthetics are an important consideration.

Typical activities and frequencies include:

- Schedule semiannual inspection for the beginning and end of the wet season for standing water, slope stability, sediment accumulation, trash and debris, and presence of burrows.
- Remove accumulated trash and debris in the basin and around the riser pipe during the semiannual inspections. The frequency of this activity may be altered to meet specific site conditions.
- Trim vegetation at the beginning and end of the wet season and inspect monthly to prevent establishment of woody vegetation and for aesthetic and vector reasons.
- Remove accumulated sediment and re-grade about every 10 years or when the accumulated sediment volume exceeds 10 percent of the basin volume. Inspect the basin each year for accumulated sediment volume.

Cost

Construction Cost

The construction costs associated with extended detention basins vary considerably. One recent study evaluated the cost of all pond systems (Brown and Schueler, 1997). Adjusting for inflation, the cost of dry extended detention ponds can be estimated with the equation:

$$C = 12.4V^{0.760}$$

where: C = Construction, design, and permitting cost, and
V = Volume (ft^3).

Using this equation, typical construction costs are:

$ 41,600 for a 1 acre-foot pond

$ 239,000 for a 10 acre-foot pond

$ 1,380,000 for a 100 acre-foot pond

Interestingly, these costs are generally slightly higher than the predicted cost of wet ponds (according to Brown and Schueler, 1997) on a cost per total volume basis, which highlights the difficulty of developing reasonably accurate construction estimates. In addition, a typical facility constructed by Caltrans cost about $160,000 with a capture volume of only 0.3 ac-ft.

An economic concern associated with dry ponds is that they might detract slightly from the value of adjacent properties. One study found that dry ponds can actually detract from the

perceived value of homes adjacent to a dry pond by between 3 and 10 percent (Emmerling-Dinovo, 1995).

Maintenance Cost

For ponds, the annual cost of routine maintenance is typically estimated at about 3 to 5 percent of the construction cost (EPA website). Alternatively, a community can estimate the cost of the maintenance activities outlined in the maintenance section. Table 1 presents the maintenance costs estimated by Caltrans based on their experience with five basins located in southern California. Again, it should be emphasized that the vast majority of hours are related to vegetation management (mowing).

Table 1 Estimated Average Annual Maintenance Effort

Activity	Labor Hours	Equipment & Material ($)	Cost
Inspections	4	7	183
Maintenance	49	126	2282
Vector Control	0	0	0
Administration	3	0	132
Materials	-	535	535
Total	**56**	**$668**	**$3,132**

References and Sources of Additional Information

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Information Resources

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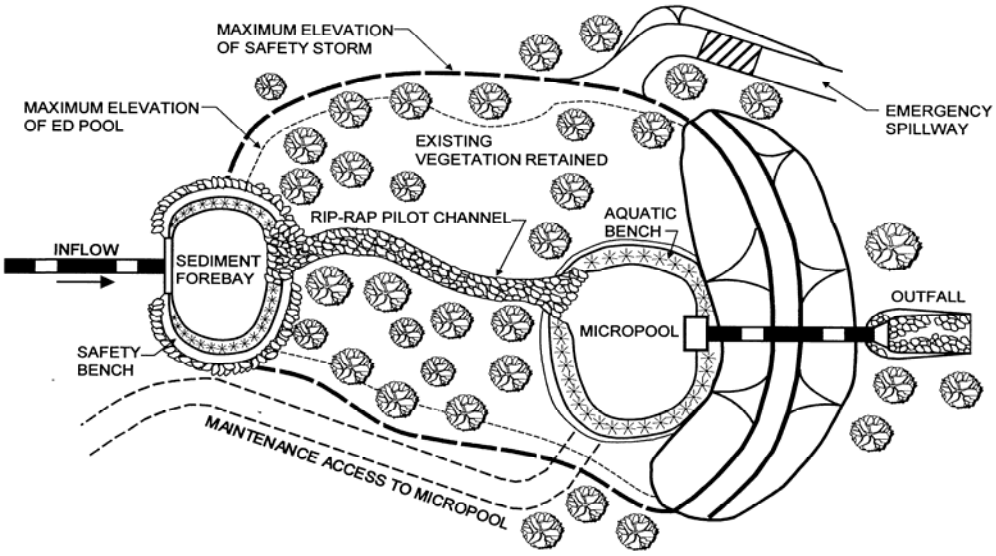
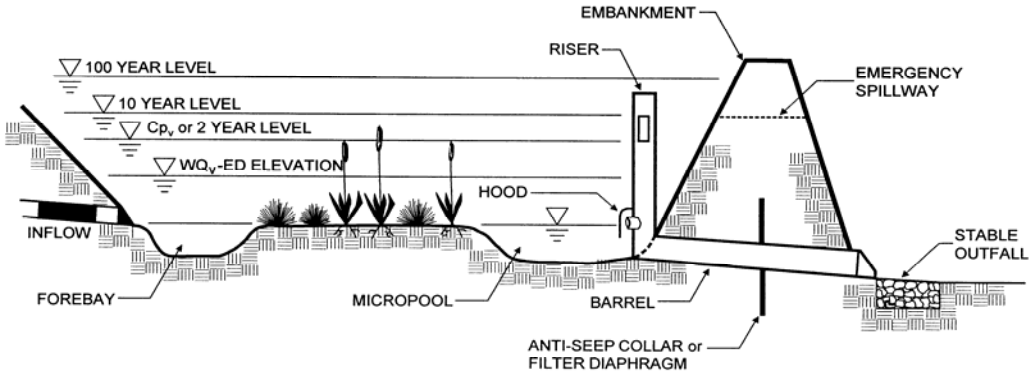


PLAN VIEW



PROFILE

Schematic of an Extended Detention Basin (MDE, 2000)

ATTACHMENT "F"

PREVENTATIVE MAINTENANCE AND ROUTINE INSPECTION					
TYPE BMP	**Routine Action**	Measurement **Indicator**	Measurement **Frequency**	MAINTENANCE ACTIVITY	SITE-SPECIFIC REQUIREMENTS
Land-scaping & irrigation	Proper irrigation & Fertilizer.	Less than 80% coverage	30 days prior to October 1st each year	Re-seed or Re- plant. Repair Irrigation system with-in 5-days.	All slopes and landscaped areas are to have a minimum coverage of 80%
Trash storage areas	Trash free and removal of silt		Daily inspection	Remove trash and silt Daily.	All trash storage areas to be free from trash and silt at all times
Roof drain	Trash free and remove silt	Silt build up of more than 1" no trash	30 days prior to October 1st each year and weekly during rain season,	Remove all trash and silt and repair any damage to roof drains	All Roof drains to be free from trash and silt and in good repair
Vegetated Buffer Strip & grass swales (TC-31)	Trash free and removal of silt	Silt build up of more than 2" no trash, Exposed soils, dead vegetation, ponded water, and excessive vegetation	30 days prior to October 1st each year and weekly during rain season	Remove trash and silt —repair and reseed exposed areas, maintain grass height so as not be shorter than the flow design depth (see Table 4.3.2) remove all ponded water weekly inspections	All vegetated buffer strip and grass swales to be free from trash and silt at all times, grass area to be free from exposed soil and maintained to proper height per flow design depth (see Table 4.3.2), ponding of water for more than 48 hours not allowed.
Extended Detention Basin (TC-22)	Trash free and removal of silt	Silt build up of more than (see manufactures specifications)	30 days prior to October 1st each year and weekly during rain season	Remove trash and silt. Annually 30 days prior to October 1.	All Detention Ponds and inlets to be free from trash and silt at all times
Storm Water Convey- ance system Stenciling & Signing	Must be legible at all times	Fading of paint or illegible letters	30 days prior to October 1st each year and weekly during rain season & semi-annual	Repaint stenciling and/or replace signs 30 days prior to October 1st.	All stenciling and signs
Drain inserts	Trash free and removal of silt	Silt build up of more than (see manufactures specifications)	30 days prior to October 1st each year and weekly during rain season	Remove trash and silt. Replace Fossil filters Annually 30 days prior to October 1st.	All Fossil-filters and inlets to be free from trash and silt at all times

ANNUAL ESTIMATED COST TO MAINTAIN BMPs

1.Operation & Maintenance Of BMPs Item	Annual Estimated Cost
1. Inspection and certification	$500.00
2. Landscaping & Bio-Filters	$4,800.00
3. Irrigation System	$1,200.00
4. Signs & Stencils	$150.00
5. Drain Inserts	$2,500.00
6. Dry Detention Basin	$6,000.00
7. Underground Pipe Detention	$1,200.00
8. Trash Storage Areas	$500.00
9. Roof Drains	$500.00
Total Estimated Annual Cost to Maintain BMPs	$17,350.00

ATTACHMENT G

CERTIFICATION SHEET

This Stormwater Management Plan has been prepared under the direction of the following Registered Civil Engineer. The Registered Civil Engineer attests to the technical information contained herein and the engineering data upon which recommendations, conclusions, and decisions are based.

RICHARD W. HARTLEY
REGISTERED CIVIL ENGINEER

01/27/07
DATE

REGISTERED PROFESSIONAL ENGINEER
RICHARD W. HARTLEY
No. 20934
EXP. 9-30-07
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STATE OF CALIFORNIA